

28, and 30 have been amended. Favorable reconsideration and allowance of the present application are respectfully requested.

Applicants thank the Examiner for the indication that Claims 6-7 and 10-12 contain allowable subject matter. This Amendment is being submitted in an earnest attempt to place the application in condition for allowance. If the Examiner believes that anything further is required in this regard, he is encouraged to contact Applicants' undersigned representative.

Claims 1, 28, and 30 have been amended to include the features that the dielectric layer is applied by silk-screening, and that the resistive layer having a discontinuous circumferential pattern is also applied by silk-screening. Claim 1 has been amended to include the features of allowable Claim 6, and similar changes have been made in independent Claims 28 and 30.

Claims 1-3, 8, 9, 14-19, 22, and 28-31 were rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley and Manov et al. Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Schmidt. Claim 5 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Collins. Claim 13 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Goldwin. Claim 20 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juliano, et al. in view of Riley, and further in view of Shipley. Claim 21 was rejected under 35 U.S.C. 103(a) as being unpatentable

over Juliano, et al. in view of Riley, and further in view of Bottari, et al. Applicants respectfully traverse these grounds of rejection.

Juliano, et al. discloses a cylindrical nozzle heater having a resistive layer that is applied using a fine line direct writing technique. The resistive layer is applied as a circumferentially continuous spiral that is disposed over the length of the cylindrical substrate. Juliano, et al. teaches away from the use of screen printing for non-flat substrates.

Riley discloses to a switch that is screen printed on a flat substrate. No examples of non-flat substrates are provided.

Manov, et al. discloses an electrical heater system having a heating ribbon that is discontinuous circumferentially.

Schmidt discloses a band heater clamp arrangement for an injection molding machine, having an inner sleeve with an axial slot that extends through the length of the sleeve, thereby allowing it to expand and contract with temperature changes.

Collins discloses resistive elements applied to substrates by either of direct writing or screen printing. However, the only example of applying a resistive element to a non-flat substrate involves the use of direct writing a continuous spiral pattern that is applied over the length of the cylindrical substrate.

Goldwin discloses an injection molding heater around a nozzle including a thin film heater with a connector to ensure the heater remains connected to the nozzle.

Shipley discloses photoforming a dielectric element in a multiplayer circuit board, and photoforming of openings.

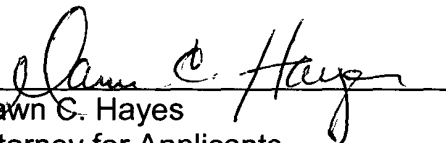
Bottari, et al. discloses formation of a wire trace pattern by laser etching.

Applicants submit that the combination of Juliano, et al. and Riley, which Applicants do not concede may be properly combined, does not teach or suggest a heater as described in Claims 1, 28, and 30, that has a "substrate layer, dielectric layer, resistive layer and contact pads, wherein the resistive layer contains a resistive trace with a discontinuous circumferential pattern that is silk-screened on the dielectric layer," as set forth in the Statement of Reasons for Allowance on page 9 of the Office Action.

Accordingly, Applicants submit that this application is in condition for allowance, and respectfully request prompt issuance of a notice thereof.

Applicants' undersigned agent may be reached by telephone at (202) 625-3500. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

  
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## **MARK-UP VERSION OF THE CLAIMS**

1. (Three Times Amended) A thick-film electric heater, comprising:
  - a) a thermally conductive non-flat substrate surface;
  - b) a silk-screened dielectric layer applied on said substrate surface;
  - c) a resistive layer [applied] silk-screened on said dielectric layer thereby forming a circuit for the generation of heat, the resistive layer having at least one resistive trace in a pattern that is discontinuous circumferentially;
  - d) at least a pair of silk-screened contact pads applied in electrical communication with said resistive layer for electrical connection to a power source; and
  - e) an insulation layer applied over said resistive layer.
  
28. (Three Times Amended) An injection mold runner nozzle having a co-axially disposed cylindrical heater comprising:
  - a) a cylindrical, thermally conductive substrate having a smaller coefficient of thermal expansion than that of said nozzle, thereby causing said substrate to clamp onto said nozzle as said nozzle and said substrate heat up;
  - b) a dielectric layer [applied] silk-screened on said substrate;

- c) a resistive layer [applied] silk-screened on said dielectric layer thereby forming an electrical circuit for heat generation, the resistive layer having at least one resistive trace in a pattern that is discontinuous circumferentially around the substrate;
- d) at least a pair of contact pads applied in electrical communication with said resistive layer for electrical connection to a power source; and
- e) an insulation layer applied over said resistive layer.

30. (Amended) A thick-film electric heater, comprising:

- a) a thermally conductive non-flat substrate surface;
- b) a dielectric layer silk-screened on said substrate surface;
- c) a resistive layer [applied] silk-screened on said dielectric layer thereby forming a circuit for the generation of heat, the resistive layer having at least one resistive trace in a pattern that is discontinuous circumferentially;
- d) at least a pair of contact pads applied in electrical communication with said resistive layer for electrical connection to a power source; and
- e) an insulation layer applied over said resistive layer.